GMD 5 Model
Technical Advisory Committee Minutes

December 11th, 2008

Attendees: USFWS: Don Anderson and Carrie Cordova; Balleau Groundwater, Inc.: Peter Balleau and Steve Silver; SSPA: Steve Larson; GMD 5: Sharon Falk; KWF: Steve Sorensen; KDA-DWR: Bruce Falk, Jeff Lanterman, Tina Alder, Andrew Lyon, Darci Paull, and Lisa Allen.

The pdf file of the presentation used during this meeting can be found at www.balleau.com , log in at the top-right button of the welcome page with the user name "GMD5", and the password "ZENITH" all in caps.

The meeting began with introductions and remarks by Peter about the first few months of model construction. He talked about how the steady state and transient model was in working order, but that the well file had not yet been developed. Peter also talked about the desire of GMD5 to model catchment areas upstream of the district and how this committee could proceed with the process. He stated BGW would be able to divide the model and show only the portions of the model and any associated files that were in the district, and that this division would be at the end of model development or sooner if practical. Pending work on well files and history will concentrate on the District area and will be shown at the next TAC. Tina stated that DWR would only review and comment on the portions of the model that were in the district.

Steve Silver then took over and jumped into model discussion. He described the model layers, and discussed the layout of the Dakota unit to allow for modeling of the salt upwelling. The Hydrogeologic Unit Flow Package (HUF) input was discussed as it uses thickness of each layer based on KGS data and sets a minimum layer thickness for each MODFLOW layer. Steve Larson asked about having a minimum thickness for the High Plains unit and whether this would cause problems where the actual thickness of the aquifer is less than the stated minimum. Steve Silver stated that the HUF package will take care of this by allocating layer transmissivity according to the fraction of geologic-material permeability represented inside a layer thickness.

Geologic cross sections were shown and discussed, and Steve Silver stated that this will probably be the preferred way to show cross sections in the future. An early water table elevation map was also shown. Properties of the HUF package were shown in the .HUF input file and discussed.

Hydraulic Conductivity Zones that were used in the previous Mid Ark and Rattlesnake Creek models were shown and discussed. It was stated that these values would be the next point for setting hydraulic conductivity, but would also need to adjusted. One problem is that the overlapping areas of the older models don't necessarily have the same hydraulic conductivity, so these areas would need a compromise value.

The stream network was shown with catchment basins and model stream reaches. The stream bed elevations were discussed, and entrenchment periods will be used on the Ark similar to the Mid Ark Model and the data will be checked against the Mid Ark and Rattlesnake Models.

Cheyenne Bottoms and Quivira were shown and it was discussed that possibly the Lake Package would need to be used to simulate storage in these areas, as the Stream Package isn't really designed for simulating the storage aspect of these types of wetland areas.

Peter then discussed the four different types of recharge in the model and gave reasons for wanting to account for the different types of recharge separately. The recharge curves that were used in the Mid Ark model were discussed, and Steve talked about how we would need to allocate the curves on a monthly basis to use them in the new model. He also stated that the model will vary recharge on a monthly basis. A table was shown that illustrates that runoff over time is variable due to different types of land use, and that this would have to be incorporated into the model. The Farm Package will be applied to selected areas of high water table.

Steve Larson talked about the effect of very wet years applying a very large and disproportionate amount of recharge. This effect and the need for a multiplier to simulate this very large recharge have been incorporated into other models in Kansas, particularly NW Kansas. Peter agreed that this is an issue, and he talked about the frequency of these events and it was stated that we need to identify the historical periods where this disproportionate recharge takes place, so that we will be able to include a representative number of these periods in any future scenarios.

Reference ET was shown that was derived from a Hargreaves calculation using monthly PRISM data. Monthly precipitation coverages derived from PRISM data was also shown. Runoff/Recharge accounting was shown on a catchment by catchment basis, and it was shown where closed outlet or poorly drained catchments would more than likely yield above average recharge. There was some discussion about the effect of playas in these areas, and the effect of these areas on recharge will be researched and looked at in greater detail.

Some trial recharge zones were shown, and these zones will be refined in the future. Some chloride data was shown and discussed, and this data is also really a starting point, and will be closely looked at in the future for compatible zonation of recharge. Model-wide flow-through is about 40 percent discharged by streams, 40 percent by evapotranspiration, and 20 percent by boundary flow.

A climate-based 113-year run with three steps per month shows the model simulates the relative steady baseflow of streams, seasonality of recharge events and aquifer storage fluctuations. The Macksville flow-duration curve was compared to the climate run to see that model high flow needs to be added, but low flow is reasonably close.

Peter then talked about some of the next steps that will be taken in the model construction process. Boundary conditions will be scrutinized and refined as well as phreatophyte ET areas. Some observed vs. simulated heads and water table elevation contours were shown and it was discussed that this would be one way to verify model results in the future.

Peter wanted to discuss the use of formal parameter estimation programs such as PEST during calibration and the problem of how long model run time would affect the use of PEST. Steve Larson suggested a few different ways to reduce model run times during calibration, such as combining model layers. Currently it takes four hours for the model to run starting in 1860.

Transient runs will now be focus of model development. Pumping data will be assembled and refined to create a well file in the very near future, and the Farm Package will be used later to enhance the well file.

Point of diversion, place of use, and accuracy of water use reports were discussed and compared to some landsat images. This is a crucial verification step as the actual amount of pumping, and irrigated area are important factors in the well and recharge files. Some determinations will need to be made about which data to include and how to weight some data. This issue will require much more discussion in future TAC meetings.

Finally, file transfer was discussed as the model files are very large. BGW is working on some different solutions and will keep everyone up to date about the best way to obtain model files and data.

Action Items:
1. DWR will communicate with Balleau Groundwater, Inc. about data needs. DWR will pull information from WIMAS and transmit this data to Balleau Groundwater, Inc. as needed.
2. DWR will research playa and no outlet areas and transmit any finding to Balleau Groundwater Inc.
3. BGW will solve some of the file transfer problems and will exchange model files with other TAC members as reviewable files are developed.